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IN THE UNITED STATES
PATENT AND TRADEMARK OFFICE

PATENT APPLICATION

Inventor: Mark J. Schnitzer **Case:** 5

Serial No.: 10/082870 **Group Art Unit:** 3737

Filed: February 25, 2002 **Examiner:** William C. Jung

Title Multi-Photon Endoscopy

COMMISSIONER FOR PATENTS
P.O. BOX 1450
ALEXANDRIA, VA 22313-1450

SIR:

Appellants' Appeal Brief Under 37 C.F.R. 41.37

Enclosed is an **Appeal Brief** and a **Petition for an Extension of Time** in the above-identified application.

Please charge Lucent Technologies **Deposit Account No. 12-2325** the amount of **$500.00 to** cover the fee for the Appeal Brief. Duplicate copies of this letter are enclosed.

In the event of non-payment or improper payment of a required fee, the Commissioner is authorized to charge or to credit **Deposit Account No. 12-2325** as required to correct the error.

Respectfully,

John McCabe

John F. McCabe, Attorney
Reg. No. 42854
908-582-6866.

Date: June 22, 2006

Docket Administrator (Room 3J-219)
Lucent Technologies Inc.
101 Crawfords Corner Road
Holmdel, NJ 07733-3030

Date of Deposit June 22, 2006

I hereby certify that this correspondence is being deposited with the United States Postal Service First Class Mail in an envelope addressed to: Mail Stop: Appeal Brief, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date indicated above.

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IN THE UNITED STATES
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PATENT APPLICATION

Inventor(s):	Mark J Schnitzer		
Case Name/No.:	5		
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Filing Date:	February 25, 2002	Examiner:	W. Jung
Title:	Multi-Photon Endoscopy		

COMMISSIONER FOR PATENTS
P.O. BOX 1450
ALEXANDRIA, VA 22313-1450

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)

SIR:

Applicants petition the Commissioner for Patents to extend the period for filing the Appeal Brief in the above-identified application for:

one month (37 CFR 1.17(a)(1))

Please charge **Lucent Technologies Deposit Account No. 12-2325** in the amount of **$120.00** to cover the cost of the extension. In the event of non-payment or improper payment of a required fee, the Commissioner is authorized to charge or to credit **Deposit Account No. 12-2325** as required to correct the error. Duplicate copies of this petition are enclosed.

06/27/2006 CNGUYEN2 00000035 122325 10082870
02 FC:1251 120.00 DA

Respectfully,

John McCabe

John F. McCabe
Attorney for Applicant(s)
Reg. No.: 42854

Date: June 22, 2006
Lucent Technologies Inc.
101 Crawfords Corner Road
Room 3J-219
Holmdel, New Jersey 07733-3030

Date of Deposit June 22, 2006
I hereby certify that this correspondence is being deposited with the United States Postal Service in a First Class Mail envelope on the date indicated above and is addressed to:
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Catherine F. Dugan
Signature of person mailing paper or fee

PT 970 (1/03)

PATENT AND TRADEMARK OFFICE

Patent Application

Inventor: Mark J. Schnitzer — **Case No.:** 5

Serial No.: 10/082,870 — **Group Art Unit:** 3737

Filing Date: Feb. 25, 2002 — **Examiner:** William C. Jung

Title: MULTI-PHOTON ENDOSCOPY

Mail Stop: <u>Appeal Brief-Patents</u>
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

APPEAL BRIEF UNDER 37 C.F.R. § 41.37

i) Real party-in-interest

The real party-in-interest is Lucent Technologies Inc., 600 Mountain Ave., Murray Hill, NJ 07974-0636. Lucent Technologies Inc. is owner of the entire interest in the application-at-issue by an assignment recorded at Reel/Frame Nos. 013176/0556 on Aug. 12, 2002.

ii) Related appeals and interferences

Appellant does not know of any Appeals, Interferences, or Judicial Proceedings related to, directly affecting, directly affected by, or have a bearing on the Board's decision in this Appeal.

iii) Status of claims

Claims 1 – 21 are rejected.

Herein, the rejections of claims 1 – 21 are appealed.

In the Final Office Action, only pages 2 – 3 state claim rejections. Thus, earlier claim rejections are either stated on those pages or assumed waived. See 37 C.F.R. §§ 113(b), 104; M.P.E.P. § 706.07.

iv) Status of amendments

There were no amendments submitted after mailing of the Final Office Action.

v) Summary of claimed subject matter

Independent claim 1 features an apparatus. The apparatus includes a non-fiber optical element having a first optical aperture (see e.g., page 10, line 13-14; Fig. 3, element 36), an endoscopic probe having first and second ends (see e.g., page 10, lines 15 -17; Fig. 3, element 38), and a detector (see e.g., page 10, lines 27 – 32; Fig. 3, elements 44, 46, 48, 50). The probe includes a compound GRIN lens configured to carry illumination light along the length of the probe (see, e.g., page 11, lines 7-14; Fig. 3, elements 38). The compound GRIN lens includes first and second serially coupled GRIN lenses of different pitch (see e.g., page 11, lines 7-14; Fig. 3, elements 37, 39). The first end is positioned to receive the illumination light from the first optical aperture (see, e.g., page 11, lines 7-8). The detector is configured to measure values of a characteristic of light emitted from the first end in response to multi-photon absorption events produced by the illumination light in a sample (see, e.g., page 11, lines 15 – 23). The detector is configured to produce an output signal for a multi-photon image of the sample (see, e.g., page 11, lines 20-25).

Independent claim 13 features a process for scanning a region of a sample with a probe having a compound GRIN lens with first and second end faces (see e.g., page 11, lines 7-14; Fig. 3, element 38). The process includes positioning the first end face of the compound GRIN lens near the region of the sample (see e.g., page 11, lines 3-5; Fig. 4, element 62) and transmitting light to the second end face of the compound GRIN lens (see e.g., page 11, lines 5-10; Fig. 4, element 64) such that the compound GRIN lens carries the light along the length of the probe. The compound GRIN lens includes first and second serially coupled GRIN lenses of different pitch (see e.g., page 11, lines 7-14; Fig. 3, elements 37, 39). The process also includes scanning one of an incidence position and an incidence angle of the light on the second end face of the compound GRIN lens (see e.g., page 11, lines 11-14; Fig. 4, element 66) while performing the transmitting to generate a scan of the region of the sample.

vi) Grounds of rejection to be reviewed on appeal

a) Whether claims 1 – 21 are anticipated under 35 U.S.C. § 102(b) by U.S. Patent 4,916,534 of Takahashi et al (Herein, referred to as Takahashi.).

b) Whether claim 3 is anticipated under 35 U.S.C. § 102(b) by Takahashi.

c) Whether claim 6 is anticipated under 35 U.S.C. § 102(b) by Takahashi.

d) Whether claims 7 – 8 are anticipated under 35 U.S.C. § 102(b) by Takahashi.

vii) Argument

a) With respect to claims 1 – 21, the Office Action does not cite a prior art teaching of each element of pending claims 1 and 13 as required for a prima facie case of anticipation. In particular, there is not a sufficient teaching of a compound GRIN lens that includes serially coupled first and second GRIN lenses of different pitch.

i) GRIN lens and pitch of a GRIN lens

Pending claims 1 and 13 recite first and second serially coupled GRIN lenses. A GRIN lens is a type of optical lens in which the refractive index is radially graded. That is, in a GRIN lens, the refractive index varies with the radial distance from the central axis of the GRIN lens. For example, the present +application states:

> various embodiments of probes use graded refractive index (GRIN) lenses, i.e., lenses with radially graded refractive indexes, …

Present application, page 2, lines 10-12.

In a GRIN lens, the radial variation of the refractive index causes light rays to follow curved paths. Since light rays have curved paths, a light beam's width oscillates along the axis of a GRIN lens. Such <u>width</u> oscillation is illustrated by light beam 3 in Figures 1A – 1C and 1E of the pending application. The <u>length of the oscillation</u> in the light beam's <u>width</u> defines the pitch of a GRIN lens. In particular, at page 4, lines 6 – 8, the present application defines the pitch of a GRIN lens as:

> For a GRIN lens, the pitch is the length of the lens material that would produce two full oscillations in a light beam's width, ...

Thus, the pitch of a GRIN lens is the distance along the axis of the GRIN lens over which a light beam's width makes two full oscillations. Over the pitch, the light beam's width has two maxima along the axis and has two minima along the axis.

Pending claims 1 and 13 further recite that:

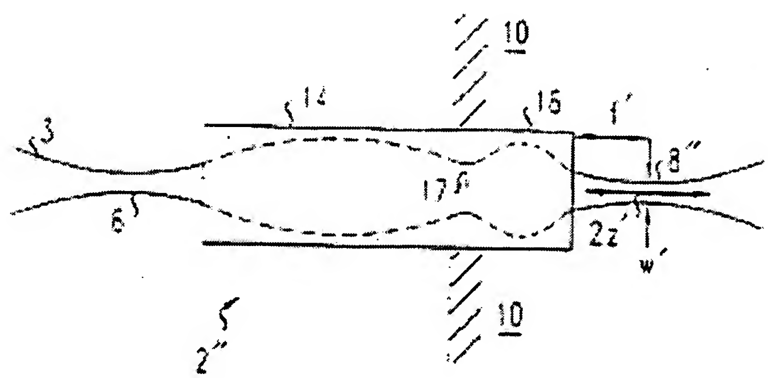
> the compound GRIN lens including first and second serially coupled GRIN lenses of <u>different pitch</u>....

(underlining added).

Figure 1C shows an exemplary compound GRIN lens with the above-recited features of claims 1 and 13. The exemplary compound GRIN lens includes serially coupled GRIN lens 14 and GRIN lens 16. Furthermore, the width of light beam 3, which is bounded by dotted lines, has a longer oscillation length in the GRIN lens 14 than it has in the GRIN

lens 16. Due to the different oscillation lengths of the light beam's width therein, GRIN lens 14 has a different pitch than the GRIN lens 16.

FIG. 1C



ii) The Office Action does not cite prior art that either explicitly teaches or inherently teaches serially coupled GRIN lenses of different pitch as recited in pending claims 1 and 13.

To anticipate claims 1 and 13, the cite prior art must explicitly or inherently teach serially coupled first and second GRIN lenses, wherein the coupled GRIN lenses have different pitches. With respect to the "different pitch feature", the Final Office Action states:

> Although Takahashi et al do not explicitly disclose compound GRIN lens configuration, Takahashi et al show in figure 17 where [sic] the GRIN lenses 40 and 41 are substantially compounded with varied refractive index, i.e., each lens having different pitch (col. 9, lines 47-53).

Office Action, page 3, lines 4 – 7.

> Takahashi et al's compounded GRIN lenses have varied refractive index, which causes different pitch. The exact written disclosure is not needed to [sic] since the refractive index inherently disclose [sic] that Takahashi et al could produce and [sic] two different pitch [sic], therefore the claims 1 and 13 are anticipated.

Office Action, page 2, lines 6 – 9.

That is, the Office Action relies solely on Takahashi, Figure 17 and col. 9, lines 47 – 53, as teaching the "different pitch feature" of pending claims 1 and 13. These portions of Takahashi neither explicitly nor inherently teach the "different pitch feature" of pending claims 1 and 13.

First, Takahashi's col. 9, lines 47 – 53, does not explicitly state that the pitches of two serially coupled GRIN lenses 40 are different. This part of Takahashi states:

> **FIG. 17** shows an Embodiment 13 of the present invention wherein radial-gradient refractive index lenses (radial-GRIN lenses) 40 and 41 in which the <u>refractive index is varied from their center portions to their peripheral portions</u> respectively are used in place of the lenses 29 and 30 in the embodiment shown in FIG. 15.

Takahashi, col. 9, lines 47 – 53 (underlining added).

While the above-cited part of Takahashi does include the statement radial-GRIN lenses "40 and 41 in which the refractive index is varied from their center portions to their peripheral portions", this statement does not imply that GRIN lenses 40 and 41 have different pitches. A better interpretation of this statement in Takahashi is that it is simply clarifying that the lenses 40 and 41 are lenses in which the refractive index varies with radial distance from the lenses' central axes, i.e., from their center portions. That is, the above-cited statement clarifies the meaning of "radial-GRIN lens" as used by Takahashi for the lenses 40 and 41. For that reason, the statements at col. 9, lines 47 – 53, of Takahashi do not imply that the GRIN lens 40 has a different pitch than the GRIN lens 41. Thus, at col. 9, lines 47 – 53, there is not an explicit disclosure of the "different pitch feature" of pending claims 1 and 13.

Second, the Final Office Action seems to state that a disclosure of a compound GRIN lens including two serially coupled GRIN lenses of different pitch is "inherent" in the statements at col. 9, lines 47-53, of Takahashi. In response, Applicants note that the fact that a result or characteristic may be present in the prior art is not sufficient to establish inherency of a teaching of the result or characteristic in the prior art. In relying on inherency, "the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic <u>necessarily</u> flows from the teachings in the prior art." Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990); M.P.E.P. § 2112, IV. In the present case, the Examiner has provided no basis in fact and/or technical reasoning to establish inherency of the "different pitch feature" in the statements at col. 9, lines 47 – 53, of Takahashi. For that reason, there is not a sufficient basis for finding that the "different pitch feature" of pending claims 1 and 13 is inherent in the statements at col. 9, lines 47 – 53, of Takahashi. In addition, an attempt to conclude that the "different pitch feature" is

inherent in the statements at col. 9, lines 47-53, of Takahashi is doomed to fail, because such a conclusion does not <u>necessarily</u> follow from the language of Takahashi. Instead of necessarily following, it is more probable that the relevant language of Takahashi simply explains the meaning of radial-GRIN lens, i.e., as lenses in which the refractive index varies radially from the central axis of the lens, and points out that the lenses 40 and 41 have radially varying refractive indexes. The presence of this more probable interpretation of the statements at col. 9, lines 47 – 53 of Takahashi means that it is not proper to find the "different pitch feature" of claims 1 and 13 as being inherent in this portion of Takahashi.

Also, the statement at col. 9, lines 47 – 53, of Takahashi that lenses 40 and 42 have radial variations in refractive index does not imply either that the pitch of GRIN lens 40 varies along its central axis or that the pitch of the GRIN lens 41 varies along its central axis.

Finally, Takahashi's Fig. 17 has nothing that would suggest that the pitch of GRIN lens 40 is different from the pitch of GRIN lens 41. In particular, Fig. 17 neither explicitly nor inherently suggests that "oscillations of a light beam's width" in GRIN lens 40 occur over a different length than in GRIN lens 41, i.e., as would otherwise be needed for different pitches. For that reason, Fig. 17 also does not explicitly teach two serially coupled GRIN lenses of different pitch. Finally, there is no basis to conclude that Takahashi's Fig. 17 inherently teaches that GRIN lenses 40 and 41 necessarily have different pitches.

For the above reasons, the Office Action does not cite sufficient prior art to explicitly or inherently teach the feature of a "compound GRIN lens including first and second serially coupled GRIN lenses of different pitch" as recited in pending claims 1 and 13. Due to the absence of a sufficient prior art citation for this feature, the Office Action has not shown anticipation of independent claims 1 and 13.

iii) Dependent claims 2 – 12 and 14 - 21 are novel over Takahashi, at least, by their dependence on one of pending claim 1 and pending claim 13.

Dependent claims 2 – 12 are novel over Takahashi as applied in the Office Action, at least, due to their dependence on claim 1.

Dependent claims 14 – 21 are novel over Takahashi as applied in the Office Action, at least, due to their dependence on claim 13.

b) With respect to claim 3, the Office Action does not cite a sufficient prior art teaching for the feature that "the compound GRIN lens has pitch length of about one or more" as recited in pending claim 3.

Whereas pending claim 3 recites that "the compound GRIN lens has pitch length of about one or more", at page 3, the Office Action cites Takahashi, col. 4, lines 31 – 46 as teaching such a feature. The only lens described in the cited portion of Takahashi is the image forming lens 1 of Fig. 4A. But, Fig. 4A shows the image forming lens 1 as having "curved refractive surfaces". Thus, the image forming lens 1 is an ordinary refractive surface lens rather than a GRIN lens as recited in pending claim 3. For that reason, the cited portion of Takahashi cannot teach the limitation of pending claim 3 on the pitch length, which is a property of GRIN lenses.

The absence of a sufficient prior art citation for the above "pitch length feature" is an independent reason for the novelty of pending claim 3 over Takahashi as applied in the Office Action.

c) With respect to claim 6, the Office Action does not cite a sufficient prior art teaching of the feature that "the pitch of the objective GRIN lens is at least five times shorter than the pitch of the relay GRIN lens" as recited in pending claim 6.

Whereas pending claim 6 recites that "the pitch of the objective GRIN lens is at least five times shorter than the pitch of the relay GRIN lens", at page 3, the Office Action cites only Takahashi, col. 9, lines 47 – 65 as teaching such a limitation. Nothing at the cited portion of Takahashi teaches a numerical limitation on the GRIN lens pitches.

The absence of a citation of prior art teaching for such a numerical limitation on the pitches of the objective and relay GRIN lenses provides an independent reason for the novelty of pending claim 6 over Takahashi as applied in the Office Action.

d) With respect to claims 7 – 8, the Office Action does not cite a sufficient prior art teaching for a compound GRIN lens having three serially coupled GRIN lenses, i.e., an objective GRIN lens, a relay GRIN lens, and a coupling GRIN lens, as recited in pending claim 7.

Whereas pending claim 7 recites that the compound GRIN lens includes three serially coupled GRIN lenses, the Office Action cites Takahashi, col. 9, lines 47- 63, as

teaching such a feature. Rather than disclosing three serially coupled GRIN lenses as in pending claim 7, the cited portion of Takahashi only discloses two serially coupled GRIN lenses, i.e., GRIN lens 40 and GRIN lens 41.

The absence of a citation of a prior art teaching for serially coupling three GRIN lenses provides an independent reason for the novelty of pending claims 7 and 8 over Takahashi as applied in the Office Action.

Respectfully,

John F. McCabe, Reg. No. 42,854
Telephone: 908-582-6866

Date: June 22, 2006

Lucent Technologies Inc.
Docket Administrator, Rm. 3J-219
101 Crawfords Corner Road
Holmdel, New Jersey 07733

viii) Claims appendix

1. (Previously presented) An apparatus, comprising:

a non-fiber optical element having a first optical aperture;

an endoscopic probe having first and second ends, the probe comprising a compound GRIN lens configured to carry illumination light along the length of the probe, the compound GRIN lens including first and second serially coupled GRIN lenses of different pitch, the first end being positioned to receive the illumination light from the first optical aperture; and

a detector configured to measure values of a characteristic of light emitted from the first end in response to multi-photon absorption events produced by the illumination light in a sample, the detector configured to produce an output signal for a multi-photon image of the sample.

2. (Previously presented) The apparatus of claim 1, wherein the probe further comprises a prism connected to an end of the compound GRIN lens.

3. (Previously presented) The apparatus of claim 2, wherein the compound GRIN lens has pitch length of about one or more.

4. (Previously presented) The apparatus of claim 1, wherein the first GRIN lens is a relay GRIN lens and the second GRIN lens is an objective GRIN lens serially coupled to the relay GRIN lens; and

wherein the objective GRIN lens has a shorter pitch than the relay GRIN lens.

5. (Original) The apparatus of claim 4, wherein the relay GRIN lens is coupled to receive light from the first optical aperture and transmit the received light to the objective GRIN lens.

6. (Original) The apparatus of claim 4, wherein the pitch of the objective GRIN lens is at least five times shorter than the pitch of the relay GRIN lens.

7. (Previously presented) The apparatus of claim 1, wherein the compound GRIN lens comprises:

a relay GRIN lens; and

an objective GRIN lens being serially coupled to one end of the relay GRIN lens; and

a coupling GRIN lens being serially coupled to an opposite end of the relay GRIN lens as the objective GRIN lens; and

wherein the objective GRIN lens and the coupling GRIN lens have shorter pitches than the relay GRIN lens.

8. (Previously presented) The apparatus of claim 7, further comprising:

a pulsed laser; and

wherein the compound GRIN lens and optical element are configured to deliver source light from the pulsed laser to the sample without the source light propagating in single mode optical fiber.

9. (Original) The apparatus of claim 1, further comprising:

a pulsed light source coupled to transmit light pulses to the optical element; and

wherein the detector is configured to measure a quantity indicative of an intensity of the light emitted from the first end.

10. (Original) The apparatus of claim 9, wherein the detector is configured to measure a characteristic of light whose wavelength is shorter than a wavelength of the light produced by the source.

11. (Original) The apparatus of claim 1, further comprising:

a processor configured to produce a scan image from the measured values and estimated positions of the multi-photon absorption events.

12. (Previously presented) The apparatus of claim 1, wherein the compound GRIN lens forms an endoscopic probe.

13. (Previously presented) A process for scanning a region of a sample with a probe having a compound GRIN lens with first and second end faces, comprising:

positioning the first end face of the compound GRIN lens near the region of the sample, the compound GRIN lens including first and second serially coupled GRIN lenses of different pitch;

transmitting light to the second end face of the compound GRIN lens such that the compound GRIN lens carries the light along the length of the probe; and

scanning one of an incidence position and an incidence angle of the light on the second end face of the compound GRIN lens while performing the transmitting to generate a scan of the region of the sample.

14. (Original) The process of claim 13, further comprising:

receiving light emitted by the region of the sample in response to the scanning; and

measuring values of a quantity indicative of an intensity or a phase of the emitted light in response to the receiving.

15. (Original) The process of claim 14, further comprising:

forming an image of the region of the sample from the measure values and positions of portions of the sample that produced the emitted light.

16. (Previously presented) The process of claim 14, wherein the receiving comprises collecting the emitted light through the first end face of the compound GRIN lens.

17. (Original) The process of claim 14, wherein the quantity is indicative of the intensity of the emitted light.

18. (Original) The process of claim 14, wherein the transmitting comprises sending a series of pulses of laser light to the second end face.

19. (Original) The process of claim 13, wherein the positioning causes the first end face to be located in the sample and the second face to be located outside the sample.

20. (Previously presented) The process of claim 14, wherein the measuring includes determining the values of the quantity for light whose wavelength is shorter than the wavelength of the transmitted light.

21. (Previously presented) The process of claim 13, wherein the act of transmitting causes the transmitted light to be transmitted through a relay GRIN lens and then, to be transmitted through an objective GRIN lens that is serially coupled to one end of the relay GRIN lens.

ix) Evidence appendix

None.

x) Related proceedings appendix

None.